CHAL-0236
COPY 2 OF 2

USAF Declass/Release Instructions On File

10 June 1958

DOPLRS

SUBJECT: (U) Transmittal of Celestial Procedures

TO: Chief-of-Staff
United States Air Force
Attn: AFOOP-OC-R
Washington, D. C.

The attached documents are transmitted per telephone conversation between Colonel Saunders, AFOOP-OC-R and Major Weller, DOPLRS, this headquarters

2 Incls
1. (U) In-Flight Celestial Procedures (4 cys)
2. (S) Celestial Grid Nav (U-2 Acft)(4 cys)

DAVID M. WILLIAMS
Colonel, USAF
Chief, Reconnaissance Branch
Operations Plans Division
Directorate of Operations

If inclosure(s) No. 1 & 2 ~~is~~(are) withdrawn (or not attached), the classification of this correspondence will be downgraded to UNCLASSIFIED in accordance with AFR 205-1.

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IN-FLIGHT CELESTIAL PROCEDURES

1. Set up the sextant as follows:

a. Set in the mag azimuth of the body under the azimuth arrow.

b. Set mag heading under the heading V. Recheck azimuth.

c. Set in the altitude of the body on the altitude dial.

d. Check for proper light setting and position of the sun filter (filter will be used for sun shots only).

2. Control the time so that the departure from the starting point is on time. As close as possible to solution time, obtain heading check. If sextant heading is significantly different from compass heading, correct aircraft to proper heading.

3. The requirements for an acceptable celestial leg are: 2 MPP's per hour, 8 LOP's, an Initial Heading Check, 1 Heading Check with each MPP, and a final ETA. It is desirable that each MPP be based on three LOP's, one obtained 5 minutes prior to fix time, one on time, and one 5 minutes after fix time. This would require the observation to be started 6 minutes prior to fix time, 1 minute prior to fix time, and 4 minutes after fix time. A heading check should be performed in conjunction with the on time observation. Apply the appropriate 1 minute correction to each observed sextant altitude. Average these values and plot the result in relation to the pre-computed LOP's. Establish a DR position for fix time, draw a perpendicular line from the in-flight averaged LOP through this DR position. Establish a point on this line which will portray the most probable position of the aircraft, weighing the DR and celestial information according to the dictates of the pilot's judgement. This procedure is then repeated for each fix.

4. After completion of the last fix, adjust the final ETA as necessary. Approximately 8½ minutes prior to expiration of ETA, make final course correction necessary to arrive over destination. The correction is determined using the formula 1° of heading correction for each nautical mile off course. For example: If last fix shows you to be 15 nautical miles right of course, 8½ minutes prior to expiration of ETA correct 15° left. This procedure may be used at any time on the celestial leg to correct back to the flight-planned course, remembering to hold the correction for only 8½ minutes.

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CELESTIAL GRID NAVIGATION (U-2 AIRCRAFT)

1. Entry into Grid Method of Navigation will be accomplished within 5 minutes of planned departure time and in the sequence listed below:

a. Determine Grid Heading by adding Grid Variation to Mag Heading.

b. Unslave MA-1 compass and precess compass to the desired Grid Heading.

c. Set latitude of position in the MA-1 compass.

d. Check Grid Heading with sextant and correct Grid Heading to match Sextant Heading.

e. As soon as heading check is completed, turn aircraft back to desired Grid Heading.

2. Control the time so that the departure from the starting point is on time.

3. Check, by means of the sextant, the Gyro Grid Heading at least every 10 minutes, starting with departure, and plot the Sextant Grid Heading on the gyro graph. At the end of the first selected period (usually 30 minutes), determine from the graph the TERMINAL GRID HEADING, re-set the MA-1 compass to this Terminal Heading, then correct in the OPPOSITE direction TWICE the amount of gyro precession from the center line (desired Grid Heading) at the end of the selected period. Plot precession on the graph during the second period. At the end of the second period the Terminal Grid Heading should equal the desired Grid Heading and the aircraft should have returned to the planned track.

4. Continue the same procedure for the remaining periods. If desired, one-half of the precession may be pre-set (as in normal grid procedures) for the remaining periods. Then, if the precession remains constant, re-set the MA-1 compass to the Terminal Grid Heading at the end of each period and correct to the Initial Grid Heading desired. When the flight-planned turn arrives, substitute the new turn heading for Initial Grid Heading desired.

5. If the precession changes in subsequent periods, make adjustments as follows: Determine by graph projection the difference in degrees between the actual average track and the predicted average track. Using the formula (1° difference of track equals lateral displacement of $3\frac{1}{2}$ nautical miles per 30 minutes of flight, and 1° correction in heading held for $8\frac{1}{2}$ minutes equals 1 nautical mile lateral displacement), correct accordingly $8\frac{1}{2}$ minutes out from termination point of appropriate leg.

6. If the final MPP is a celestial course line land-fall, use celestial information to correct into destination (1° correction held for $8\frac{1}{2}$ minutes gives 1 nautical mile lateral displacement).

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